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Test report

237925-1TRFWL

Date of issue: September 11, 2013

Applicant:

6harmonics Inc.

Product:

Television Band Device (TVBD)

Model:

GWS 3000

FCC ID:

2AASTGWS-3000

Specification:

FCC 47 CFR Part 15 Subpart H

Television Band Devices

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

Test location

Company name:	Nemko Canada Inc.
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City:	Ottawa
Province:	Ontario
Postal code:	K1V 1H2
Country:	Canada
Telephone:	+1 613 737 9680
Facsimile:	+1 613 737 9691
Toll free:	+1 800 563 6336
Website:	www.nemko.com
Site number:	FCC: 176392; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by:	Andrey Adelberg, Senior Wireless/EMC Specialist
Reviewed by:	Kevin Rose, Wireless/EMC Specialist
Date:	September 11, 2013
Signature:	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name:	6harmonics Inc.
Address:	Suite 10 - 21 Concourse Gate
City:	Ottawa
Province/State:	ON
Postal/Zip code:	K2E 7S4
Country:	Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart H	Television Band Devices

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Exclusions

None

1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15, general requirements test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§15.31(e)	Variation of power source	Pass[1]
§15.203	Antenna requirement	Pass[2]

Notes: [1] Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

[2] The Antennas are professionally installed.

2.2 FCC Part 15 Subpart H, test results

Part	Test description	Verdict
§15.709(a)(1)	Maximum conducted output power for fixed TVBDs	Pass
§15.709(a)(5)(i)	Power spectral density for fixed TVBDs	Pass
§15.709(c)(1)(i)	Adjacent channel power for fixed TVBDs	Pass
§15.709(c)(3)	Radiated spurious emissions from TVBDs	Pass
§15.709(c)(4)	Emissions in the band 602–620 MHz	Pass
§15.709(c)(5)	AC power line conducted limits	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	May 27, 2013
Nemko sample ID number	1

3.2 EUT information

Product name	Television Band Device (TVBD)
Model	GWS 3000
Serial number	791000019

3.3 Technical information

Operating band	470–698 MHz
Operating frequency	473–695 MHz
Modulation type	BPSK, QPSK, 16-QAM, 64-QAM
Emission designator	W7D
Power requirements	24 V_{DC} via PoE 120 V_{AC} 60 Hz
Antenna information	6 dBi Omnidirectional antenna, MN# SL13304B 11 dBi Sector antenna, MN# SL12948B

3.4 Product description and theory of operation

The 6Harmonics Inc. GWS radios are a new class of radios designed for the global white space radio market. The GWS-3000 is designed to provide up to 20 dBm of transmit power, offer a sensitivity of up to −100 dBm, and provide 14.4 Mbps of UDP throughput in a 6 MHz television channel. The product can be used for Point to Point or Point to Multi-point operation.

3.5 EUT exercise details

The GWS-3000 is powered from a POE Midspan. During the tests a laptop was used to connect to the GWS-3000 and configure the device to transmit continuously with the desired modulation and power.

3.6 EUT setup diagram

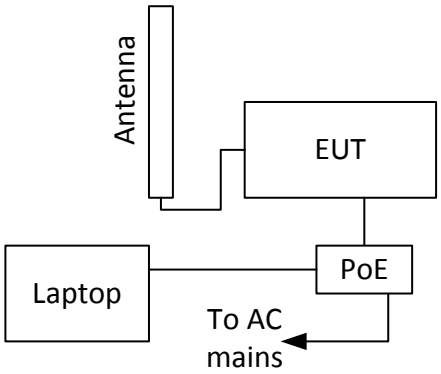


Figure 3.6-1: *Setup diagram*

3.7 EUT sub assemblies

Table 3.7-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
PoE	PoweDsine	9001G	40/SP
Laptop	Dell Latitude	D810	None

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/14
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Power supply	California Inst.	3001I	FA001021	1 year	Feb 08/14
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Feb. 28/14
Horn antenna #2	EMCO	3115	FA000825	1 year	Feb. 21/14
1–18 GHz pre-amplifier	JCA	JCA118-503	FA002091	1 year	July 03/13
Bilog antenna	Sunol	JB3	FA002108	1 year	Feb. 21/14
50 Ω coax cable	Huber + Suhner	None	FA002394	1 year	June 27/13
LISN	Rohde & Schwarz	ENV216	FA002023	1 year	Nov. 26/13
Band Pass Filter	K&L	3BT-00012	FA001506	—	VOU
Band Reject Filter	K&L	3TNF-00007	FA001330	—	VOU
Preamp (100 kHz – 1.3 GHz)	HP	8447D	FA001747	—	VOU

Note: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 FCC 15.709(c)(5) AC power line conducted emissions limits

8.1.1 Definitions and limits

TVBDs connected to the AC power line are required to comply with the conducted limits set forth in § 15.207.
§ 15.207: Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Table 8.1-1: *Conducted emissions limit*

Frequency of emission, MHz	Conducted limit, dBµV	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Note: * - Decreases with the logarithm of the frequency.

8.1.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.1.3 Observations, settings and special notes

The EUT was set up as tabletop configuration.

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

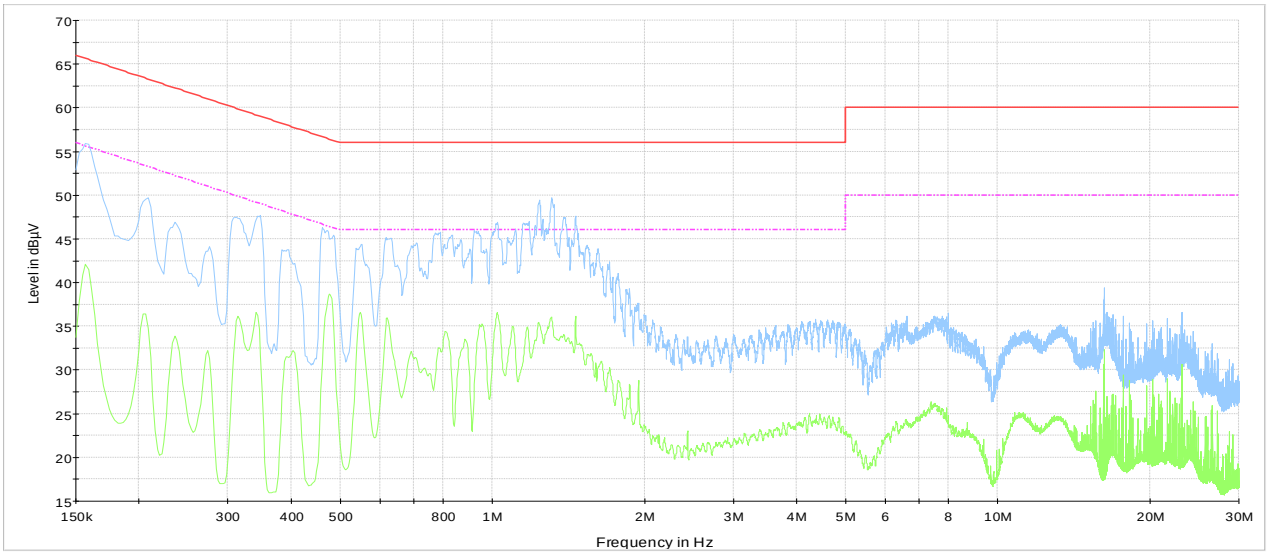
Receiver settings for preview measurements:

Resolution bandwidth:	10 kHz
Video bandwidth:	30 kHz
Detector mode:	Peak and Average
Trace mode:	Max Hold
Measurement time:	1000 ms

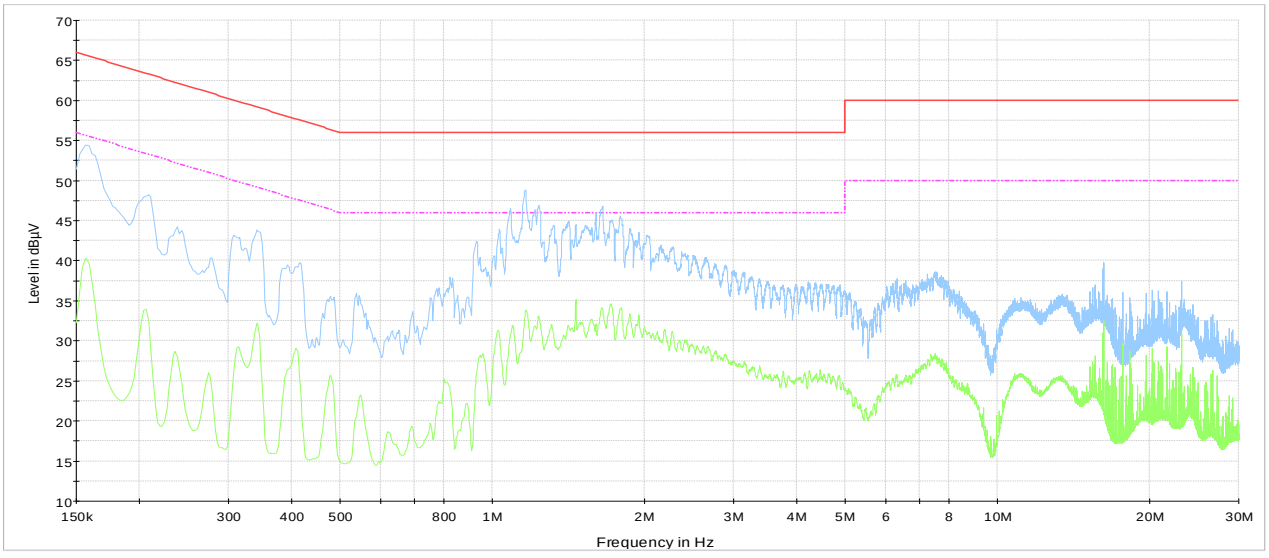
Receiver settings for final measurements:

Resolution bandwidth:	9 kHz
Video bandwidth:	30 kHz
Detector mode:	Quasi-Peak and Average
Trace mode:	Max Hold
Measurement time:	1000 ms

8.1.4 Test data



Plot 8.1-1: *Conducted emissions on phase line*



Plot 8.1-2: *Conducted emissions on neutral line*

8.2 FCC 15.709(a)(1) Maximum conducted output power for TVBDs

8.2.1 Definitions and limits

(1) For fixed TVBDs, the maximum power delivered to the transmitting antenna shall not exceed one watt per 6 megahertz of bandwidth (30 dBm/6 MHz) on which the device operates. The power delivered to the transmitting antenna is the maximum conducted output power reduced by the signal loss experienced in the cable used to connect the transmitter to the transmit antenna. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(4) Maximum conducted output power is the total transmit power over the occupied bandwidth delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

8.2.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.2.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	100 kHz (integrated over 6 MHz)
Video bandwidth:	1 MHz
Frequency span:	20 MHz
Detector mode:	RMS
Trace mode:	Power averaging
Averaging sweep number:	100

Output power limit for sector antenna with 11 dBi gain was calculated as follows: 30 dBm – (11 dBi – 6 dBi) = 25 dBm

8.2.4 Test data

Table 8.2-1: *Output power measurements*

Antenna gain, dBi	Modulation	Frequency, MHz	Output power, dBm	Limit, dBm	Margin, dB
6	BPSK	473	**19.80**	**30.00**	**10.20**
		587	**17.74**	**30.00**	**12.26**
		695	**17.52**	**30.00**	**12.48**
	64-QAM	473	**19.55**	**30.00**	**10.45**
		587	**17.07**	**30.00**	**12.93**
		695	**17.52**	**30.00**	**12.48**
11	BPSK	473	**19.80**	**25.00**	**5.20**
		587	**17.74**	**25.00**	**7.26**
		695	**17.52**	**25.00**	**7.48**
	64-QAM	473	**19.55**	**25.00**	**5.45**
		587	**17.27**	**25.00**	**7.73**
		695	**17.52**	**25.00**	**7.48**

8.2.4 Test data, continued

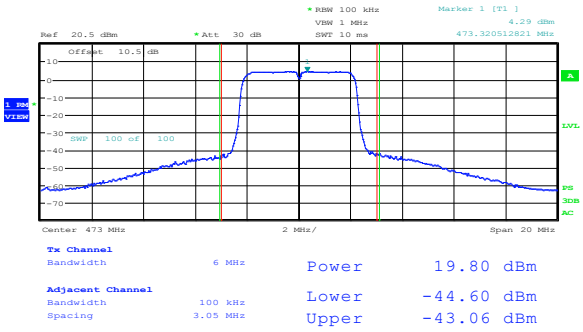


Figure 8.2-1: *Output power on low channel, BPSK*

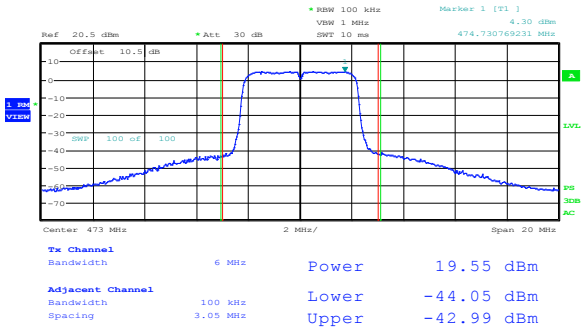


Figure 8.2-2: *Output power on low channel, 64-QAM*

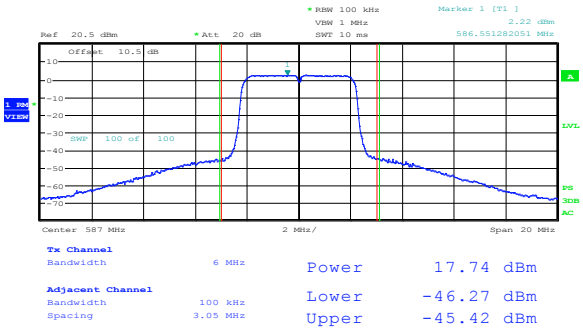


Figure 8.2-3: *Output power on mid channel, BPSK*

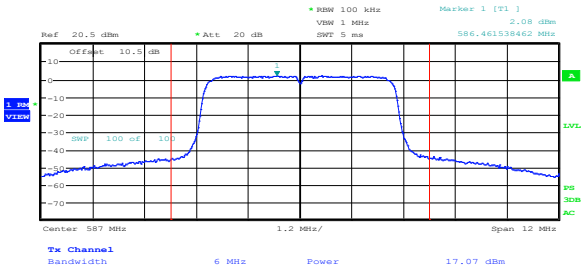


Figure 8.2-4: *Output power on mid channel, 64-QAM*

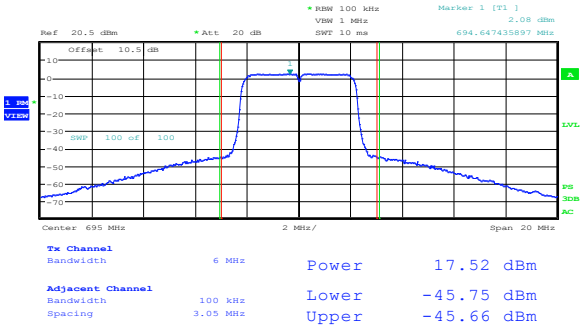


Figure 8.2-5: *Output power on high channel, BPSK*

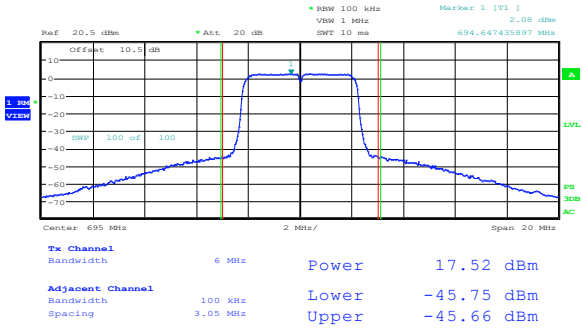


Figure 8.2-6: *Output power on high channel, 64-QAM*

8.3 FCC 15.709(a)(5)(i) Power spectral density from the fixed TVBDs

8.3.1 Definitions and limits

The conducted power spectral density from the fixed TVBD shall not be greater than 12.6 dBm when measured in any 100 kHz band during any time interval of continuous transmission.
If transmitting antennas of directional gain greater than 6 dBi are used, this conducted power level shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.3.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	100 kHz
Video bandwidth:	1 MHz
Frequency span:	20 MHz
Detector mode:	RMS
Trace mode:	Power averaging
Averaging sweep number:	100

PSD limit for sector antenna with 11 dBi gain was calculated as follows: 12.6 dBm/100 kHz – (11 dBi – 6 dBi) = 7.6 dBm/100 kHz

8.3.4 Test data

Table 8.3-1: *PSD measurements*

Antenna gain, dBi	Modulation	Frequency, MHz	PSD, dBm/100 kHz	Limit, dBm/100 kHz	Margin, dB
6	BPSK	473	**4.29**	**12.60**	**8.31**
		587	**2.22**	**12.60**	**10.38**
		695	**2.08**	**12.60**	**10.52**
	64-QAM	473	**4.30**	**12.60**	**8.30**
		587	**2.02**	**12.60**	**10.58**
		695	**2.08**	**12.60**	**10.52**
11	BPSK	473	**4.29**	**7.60**	**3.31**
		587	**2.22**	**7.60**	**5.38**
		695	**2.08**	**7.60**	**5.52**
	64-QAM	473	**4.30**	**7.60**	**3.30**
		587	**1.88**	**7.60**	**5.72**
		695	**2.08**	**7.60**	**5.52**

8.3.4 Test data, continued

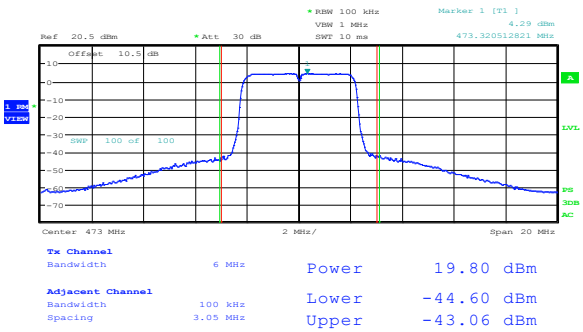


Figure 8.3-1: *Power spectral density on low channel, BPSK*

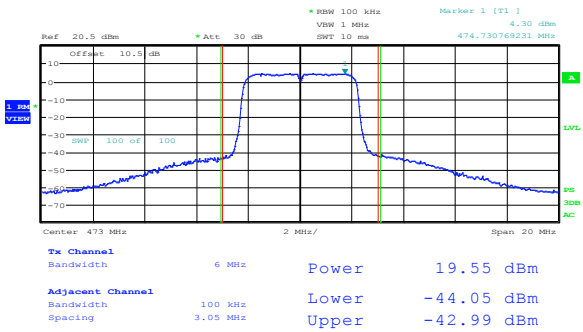


Figure 8.3-2: *Power spectral density on low channel, 64-QAM*

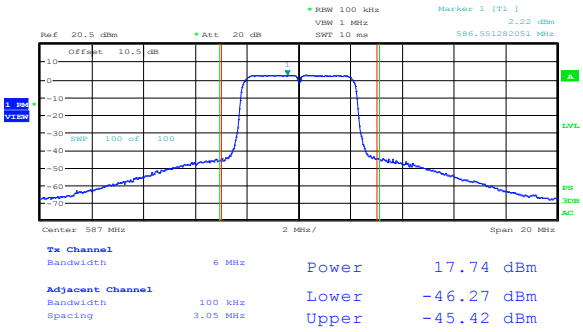


Figure 8.3-3: *Power spectral density on mid channel, BPSK*

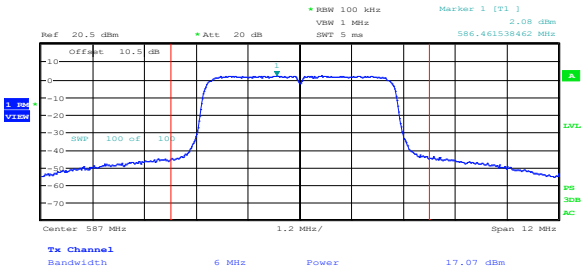


Figure 8.3-4: *Power spectral density on mid channel, 64-QAM*

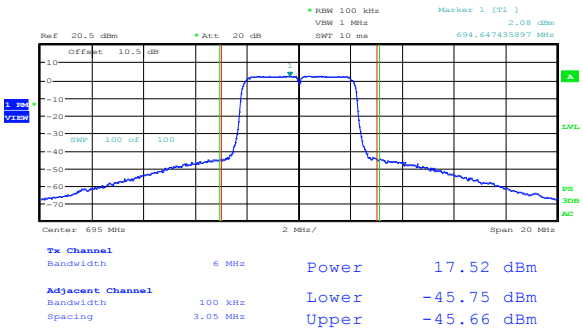


Figure 8.3-5: *Power spectral density on high channel, BPSK*

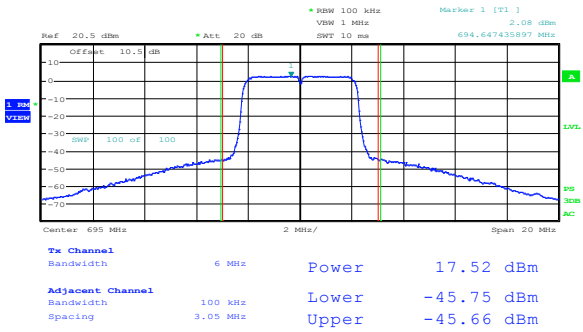


Figure 8.3-6: *Power spectral density on high channel, 64-QAM*

8.4 FCC 15.709(c)(1)(i) Adjacent channel power for fixed TVBDs

8.4.1 Definitions and limits

(1)(i) In the television channels immediately adjacent to the channel in which the TVBD is operating, emissions from the TVBD shall not exceed the level of −42.8 dBm conducted power.
(2) Emission measurements in the adjacent channels shall be performed using a minimum resolution bandwidth of 100 kHz with an average detector. A narrower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 100 kHz.

8.4.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.4.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	100 kHz
Video bandwidth:	1 MHz
Frequency span:	20 MHz
Detector mode:	RMS
Trace mode:	Power averaging
Averaging sweep number:	100

8.4.4 Test data

Table 8.4-1: *Adjacent channel power (ACP) measurements*

Modulation	Channel	Frequency, MHz	Lower ACP, dBm/100 kHz		Margin, dB	Upper ACP, dBm/100 kHz		Margin, dB
			Measured	Limit		Measured	Limit	
BPSK	Low	473	**-44.60**	**-42.80**	**1.80**	**-43.06**	**-42.80**	**0.26**
	Mid	587	**-46.27**	**-42.80**	**3.47**	**-45.42**	**-42.80**	**2.62**
	High	695	**-45.75**	**-42.80**	**2.95**	**-45.66**	**-42.80**	**2.86**
64-QAM	Low	473	**-44.05**	**-42.80**	**1.25**	**-42.99**	**-42.80**	**0.19**
	Mid	587	**-43.94**	**-42.80**	**1.14**	**-43.09**	**-42.80**	**0.29**
	High	695	**-45.75**	**-42.80**	**2.95**	**-45.66**	**-42.80**	**2.86**

Notes: Margin = Limit – Measured level.

8.4.4 Test data, continued

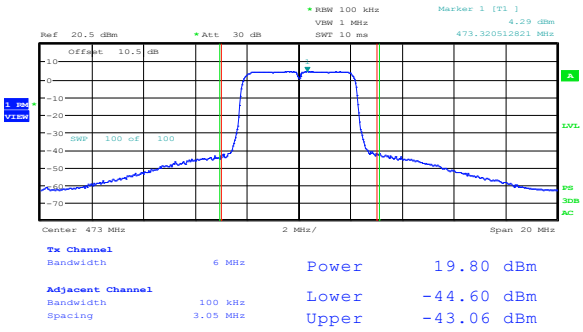


Figure 8.4-1: *Adjacent channel power on low channel, BPSK*

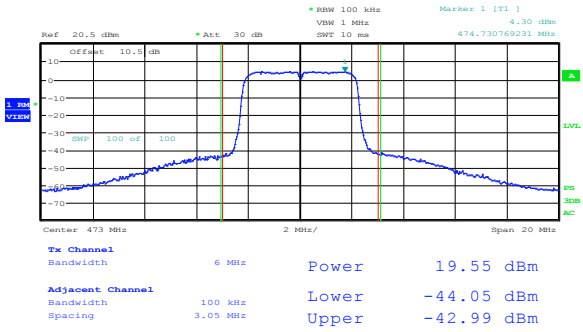


Figure 8.4-2: *Adjacent channel power on low channel, 64-QAM*

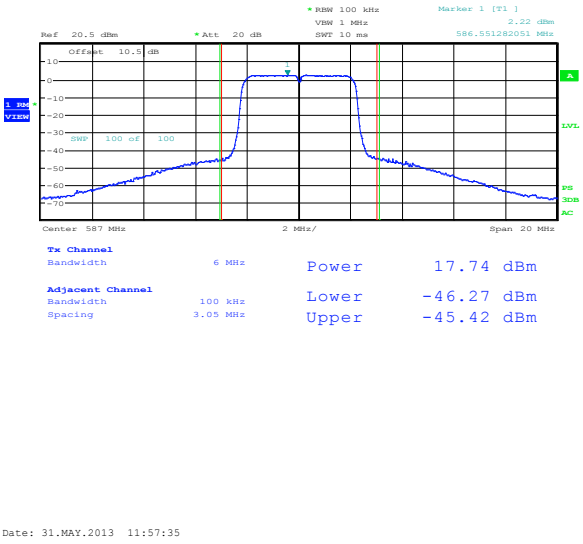


Figure 8.4-3: *Adjacent channel power on mid channel, BPSK*

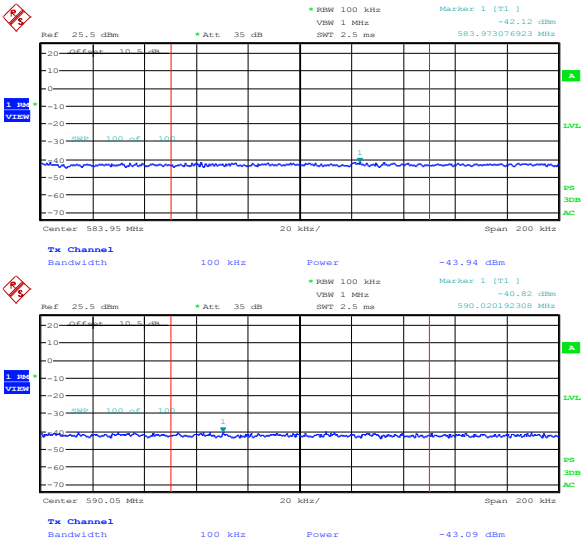


Figure 8.4-4: *Adjacent channel power on mid channel, 64-QAM*

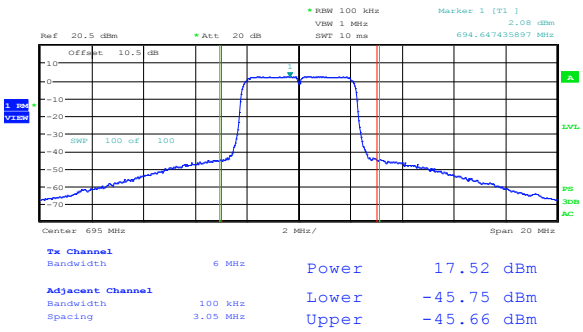


Figure 8.4-5: *Adjacent channel power on high channel, BPSK*

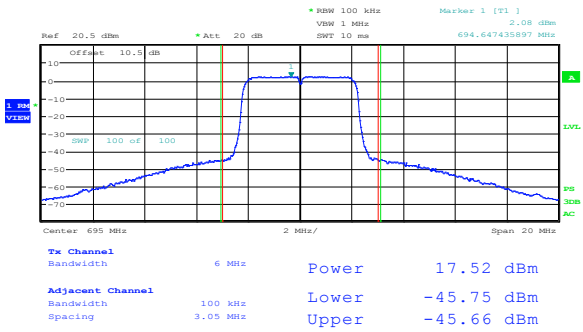


Figure 8.4-6: *Adjacent channel power on high channel, 64-QAM*

8.5 FCC 15.709(c)(3) Radiated spurious emissions beyond the television channels

8.5.1 Definitions and limits

At frequencies beyond the television channels immediately adjacent to the channel in which the TVBD is operating (±9 MHz), the radiated emissions from TVBDs shall meet the requirements of § 15.209.

Table 8.5-1: *FCC §15.209 and RSS-Gen – Radiated emission limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

8.5.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.5.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.
EUT was set to transmit with 100 % duty cycle.
Radiated measurements were performed at a distance of 3 m.

Spectrum analyser settings for radiated measurements below 1 GHz:

Resolution bandwidth:	120 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak or Quasi-peak
Trace mode:	Max Hold

Spectrum analyser settings for peak radiated measurements above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Average
Trace mode:	Max Hold

8.5.4 Test data

Table 8.5-2: *Radiated spurious emissions measurements beyond Fc ±9 MHz*

Antenna type	Channel	Frequency, MHz	Peak field strength, dBµV/m	Peak limit, dBµV/m	Margin, dB	Average field strength, dBµV/m	Average limit, dBµV/m	Margin, dB
Sector	Low	1419	58.98	74.00	15.02	49.65	54.00	4.35
	Low	2447	58.11	74.00	15.89	48.43	54.00	5.57
	Mid	1174	60.46	74.00	13.54	44.73	54.00	9.27
	Mid	1760	50.84	74.00	23.16	39.09	54.00	14.91
	Mid	2446	64.01	74.00	9.99	53.58	54.00	0.42
	High	2447	56.88	74.00	17.12	48.15	54.00	5.85
Onmidirectional	Low	1418	56.43	74.00	17.57	47.44	54.00	6.56
	Low	2446	61.19	74.00	12.81	50.35	54.00	3.65
	Mid	1174	53.85	74.00	20.15	43.43	54.00	10.57
	Mid	1760	49.53	74.00	24.47	39.38	54.00	14.62
	Mid	2446	62.79	74.00	11.21	52.78	54.00	1.22
	High	2446	61.42	74.00	12.58	51.77	54.00	2.23

Table 8.5-3: *Radiated spurious emissions measurements at the Fc ±9 MHz*

Antenna type	Channel	Frequency, MHz	Field strength, dBµV/m	Limit, dBµV/m	Margin, dB
Sector	Low	464	41.04	46.00	4.96
		482	42.99	46.00	3.01
	Mid	578	44.89	46.00	1.11
		596	44.01	46.00	1.99
	High	686	42.10	46.00	3.90
		704	43.32	46.00	2.68
Onmidirectional	Low	464	39.80	46.00	6.20
		482	41.60	46.00	4.40
	Mid	578	42.60	46.00	3.40
		596	43.88	46.00	2.12
	High	686	43.86	46.00	2.14
		704	43.23	46.00	2.77

8.5.4 Test data, continued

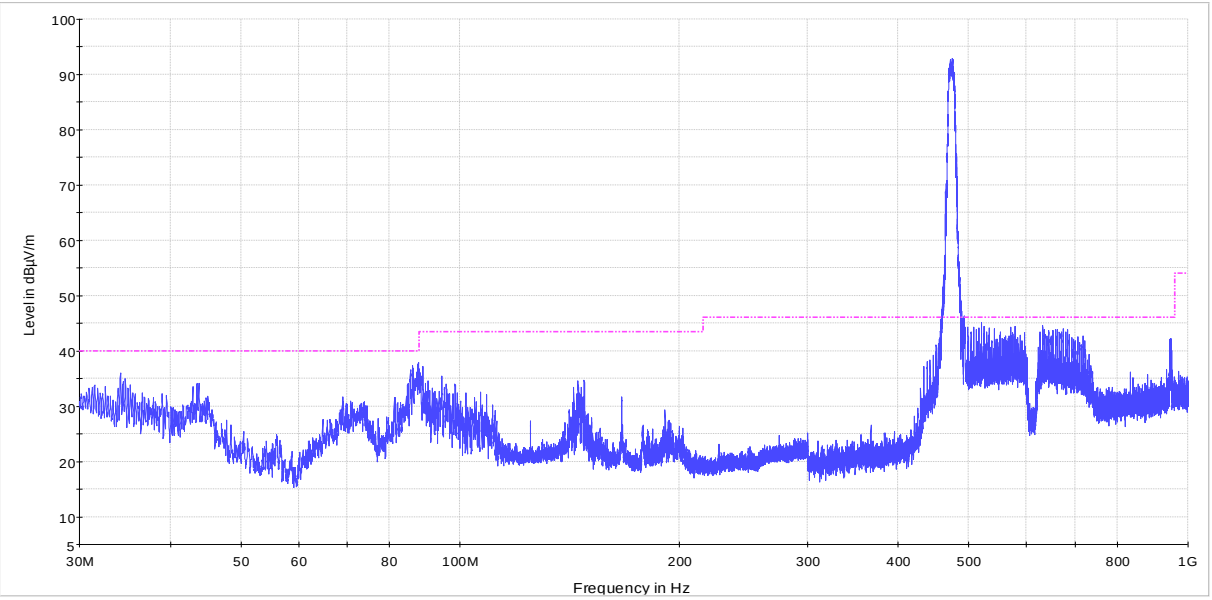


Figure 8.5-1: *Radiated spurious emissions for low channel below 1 GHz, sample plot*

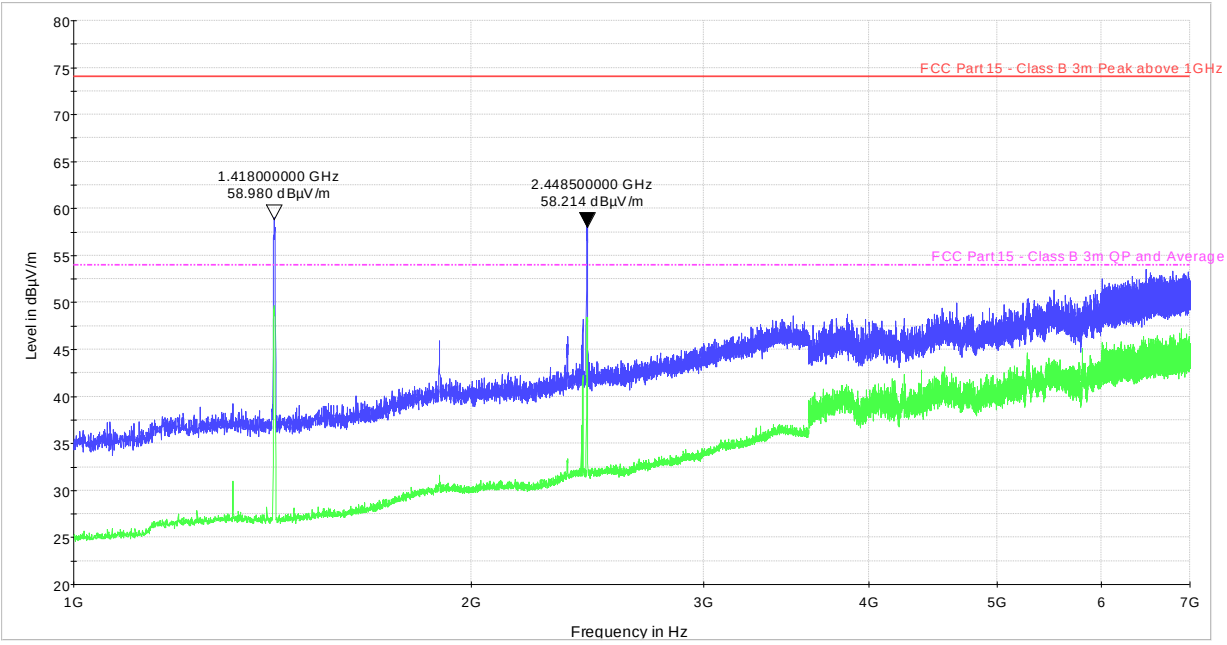


Figure 8.5-2: *Radiated spurious emissions for low channel above 1 GHz, sample plot*

8.5.4 Test data, continued

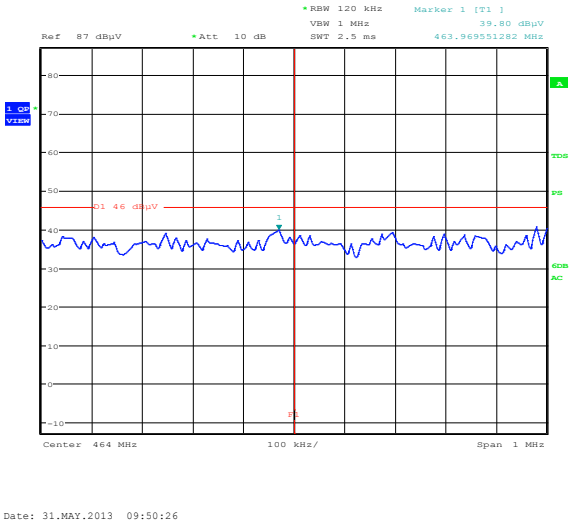


Figure 8.5-3: *Lower band edge at 473 MHz – 9 MHz, for omnidirectional antenna*

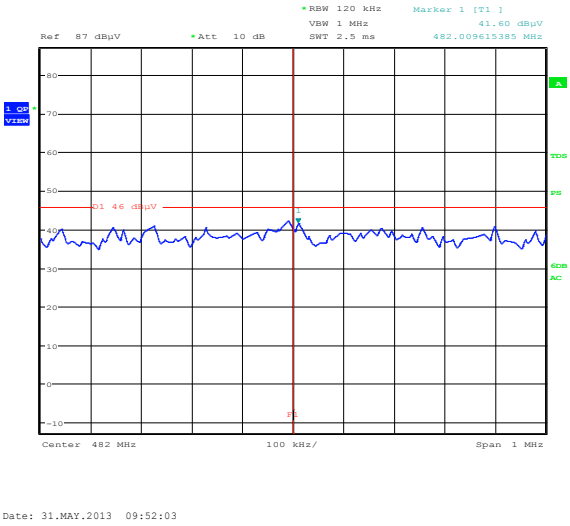


Figure 8.5-4: *Upper band edge at 473 MHz + 9 MHz, for omnidirectional antenna*

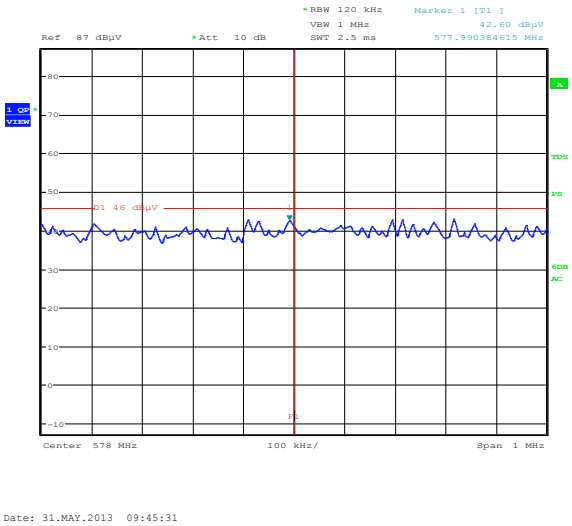


Figure 8.5-5: *Lower band edge at 587 MHz – 9 MHz, for omnidirectional antenna*

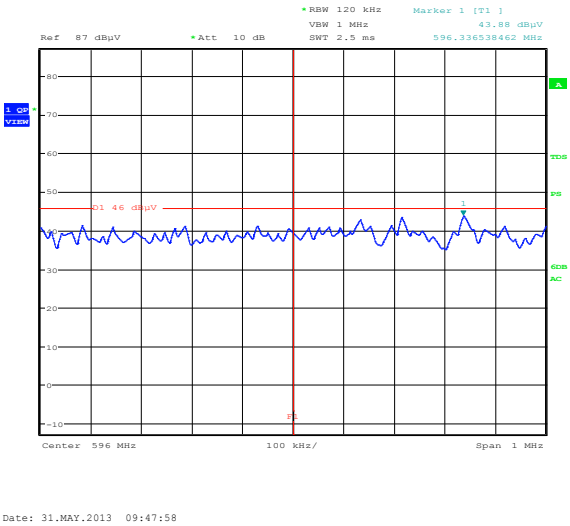


Figure 8.5-6: *Upper band edge at 587 MHz + 9 MHz, for omnidirectional antenna*

8.5.4 Test data, continued

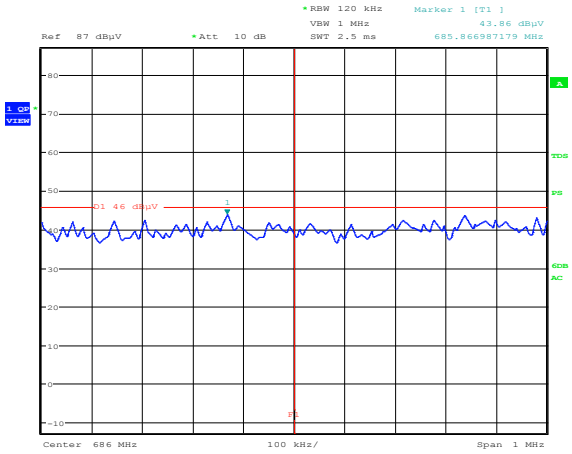


Figure 8.5-7: *Lower band edge at 695 MHz – 9 MHz, for omnidirectional antenna*

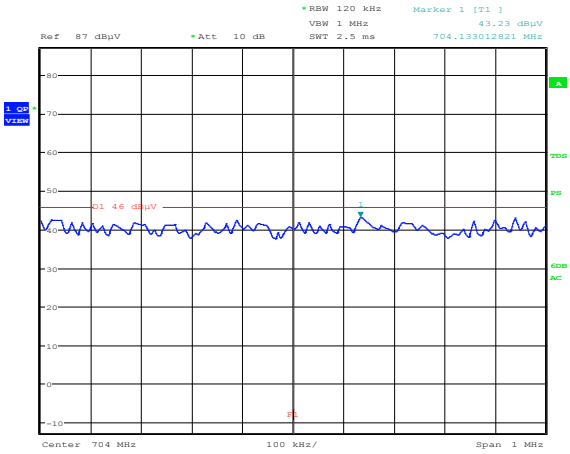


Figure 8.5-8: *Upper band edge at 695 MHz + 9 MHz, for omnidirectional antenna*

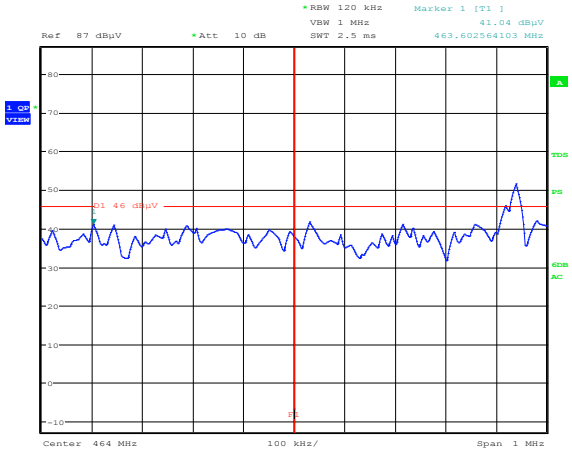


Figure 8.5-9: *Lower band edge at 473 MHz – 9 MHz, for sector antenna*

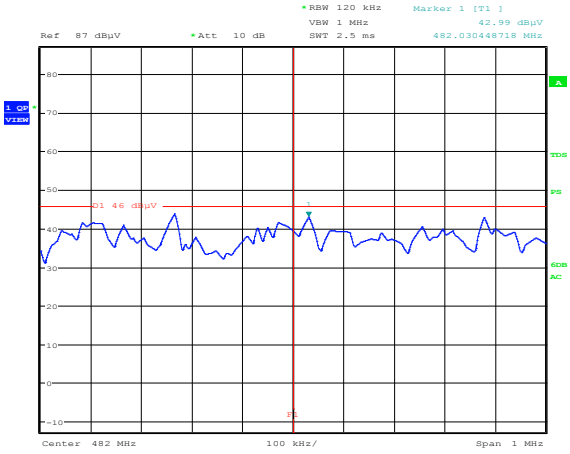


Figure 8.5-10: *Upper band edge at 473 MHz + 9 MHz, for sector antenna*

8.5.4 Test data, continued

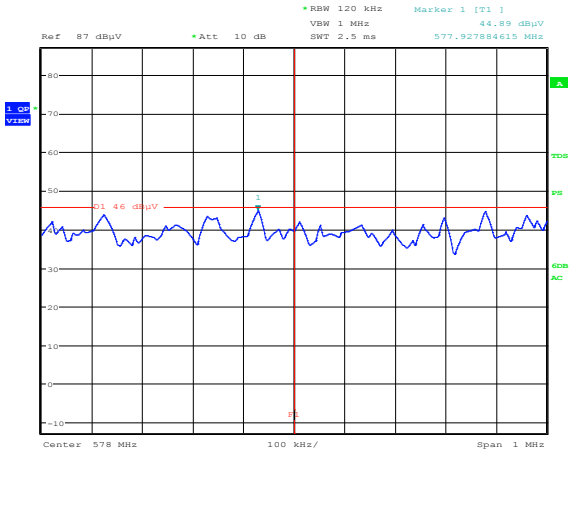


Figure 8.5-11: *Lower band edge at 587 MHz – 9 MHz, for sector antenna*

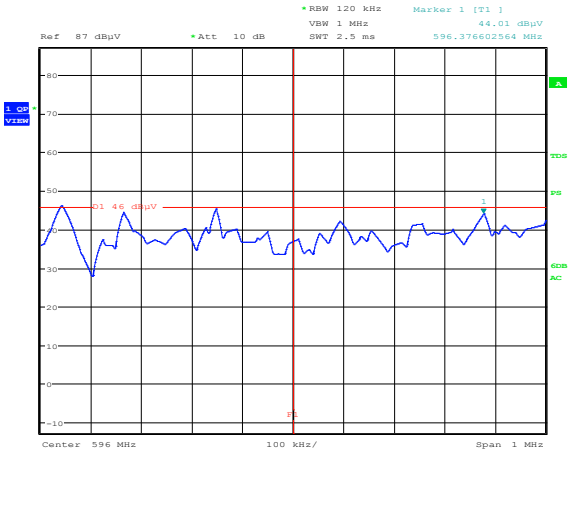


Figure 8.5-12: *Upper band edge at 587 MHz + 9 MHz, for sector antenna*

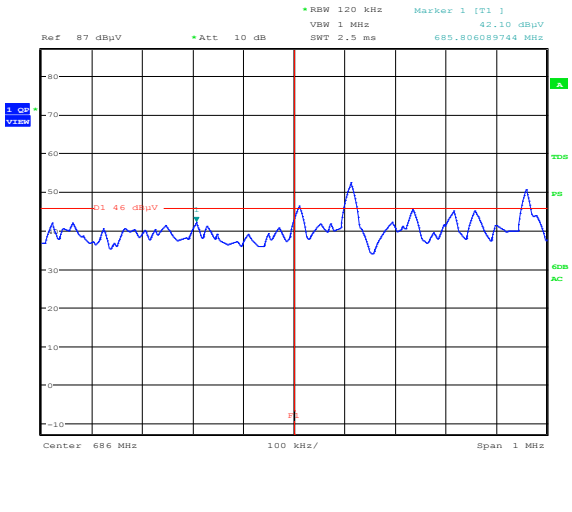


Figure 8.5-13: *Lower band edge at 695 MHz – 9 MHz, for sector antenna*

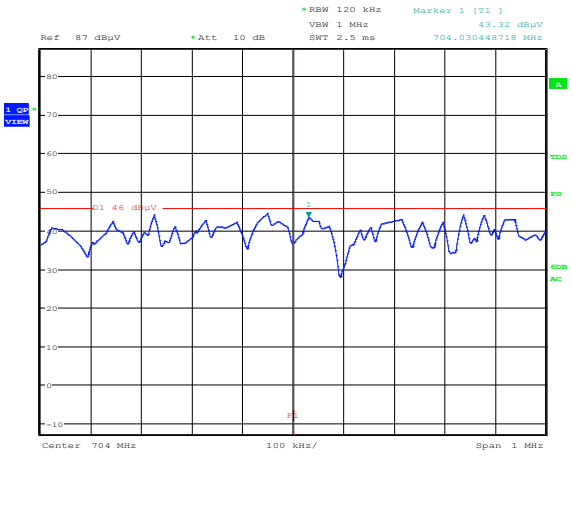


Figure 8.5-14: *Upper band edge at 695 MHz + 9 MHz, for sector antenna*

8.6 FCC 15.709(c)(4) Emissions in the band 602–620 MHz

8.6.1 Definitions and limits

Emissions in the band 602–620 MHz must also comply with the following field strength limits at a distance of one meter:

Table 8.6-1: *602–620 MHz band field strength limits*

Frequency, MHz	Field strength, dBµV/m/120 kHz
602–607	120 – 5 × (F – 602)
607–608	95
608–614	30
614–615	95
615–620	120 – 5 × (620 – F)

Notes: F is frequency in MHz

8.6.2 Test summary

Test date:	May 27, 2013	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1006 mbar
Verdict:	Pass	Relative humidity:	32 %

8.6.3 Observations, settings and special notes

The spectrum was searched from 602 MHz to the 620 MHz.
EUT was set to transmit with 100 % duty cycle.
Radiated measurements were performed at a distance of 1 m.
In order to eliminate the LNA's overloading, notch filter tuned to the fundamental frequency and band pass filter tuned on 602–620 MHz band were used:

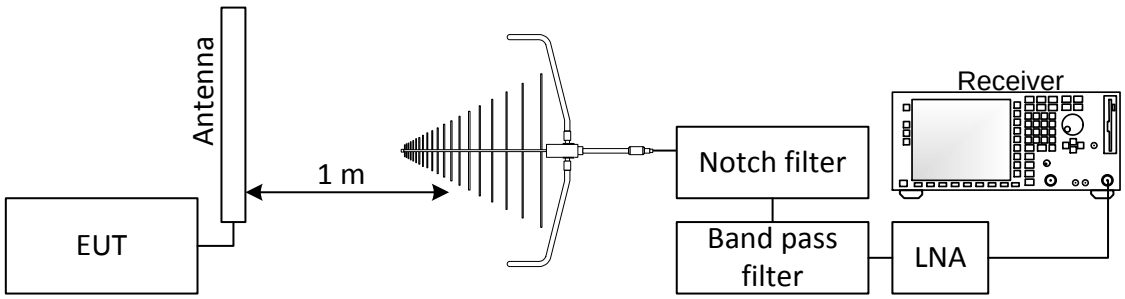


Figure 8.6-1: *Setup diagram for 602–620 MHz radiated emissions measurements*

Spectrum analyser settings:

Resolution bandwidth:	120 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

8.6.4 Test data

Table 8.6-2: *Radiated spurious emissions measurements*

Antenna type	Channel	Frequency, MHz	Field strength, dBµV/m	Limit, dBµV/m	Margin, dB
Sector	14 (Low)	614.03	**24.45**	**30.00**	**5.55**
	35	608.77	**26.94**	**30.00**	**3.06**
	39	613.79	**28.74**	**30.00**	**1.26**
	51 (High)	610.31	**24.61**	**30.00**	**5.39**
Onmidirectional	14 (Low)	608.40	**24.87**	**30.00**	**5.13**
	35	612.36	**25.20**	**30.00**	**4.80**
	39	609.47	**24.39**	**30.00**	**5.61**
	51 (High)	613.31	**24.58**	**30.00**	**5.42**

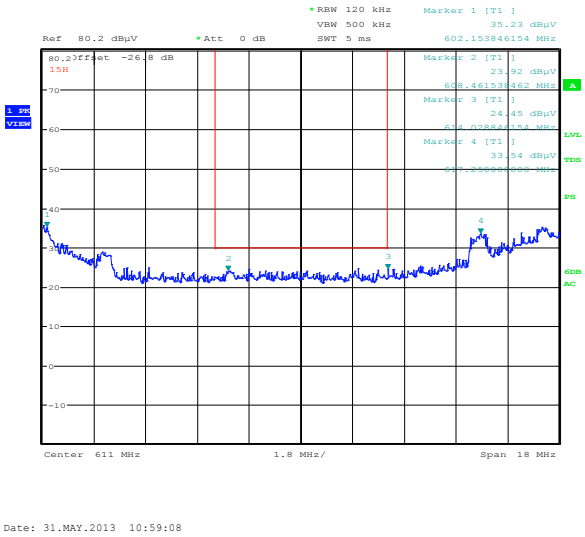


Figure 8.6-2: *Radiated spurious emissions within 602–620 MHz for low channel, sector antenna*

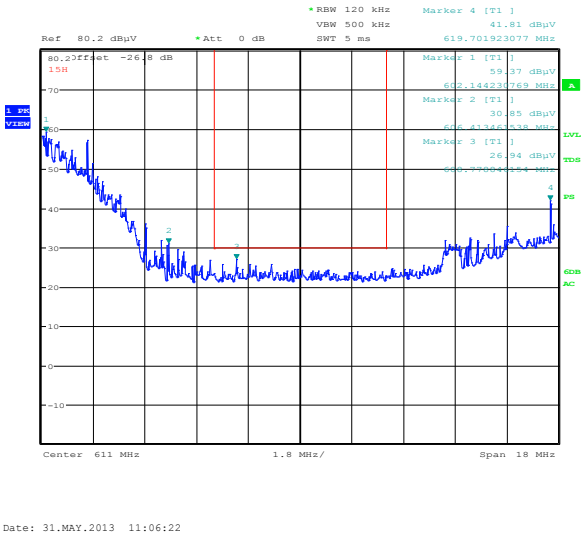


Figure 8.6-3: *Radiated spurious emissions within 602–620 MHz for channel 35, sector antenna*

8.6.4 Test data, continued

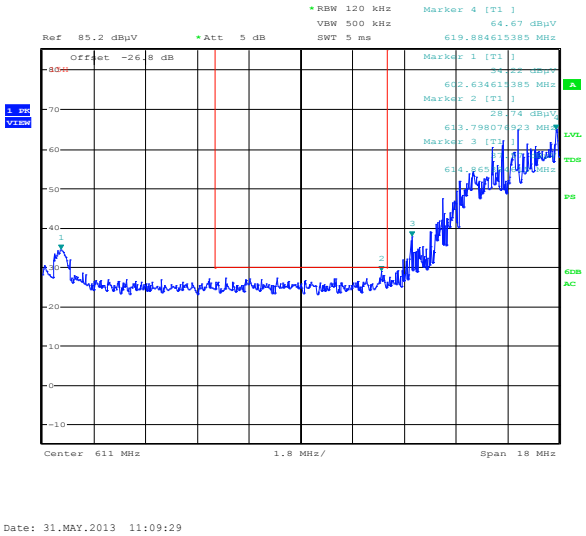


Figure 8.6-4: *Radiated spurious emissions within 602–620 MHz for channel 39, sector antenna*

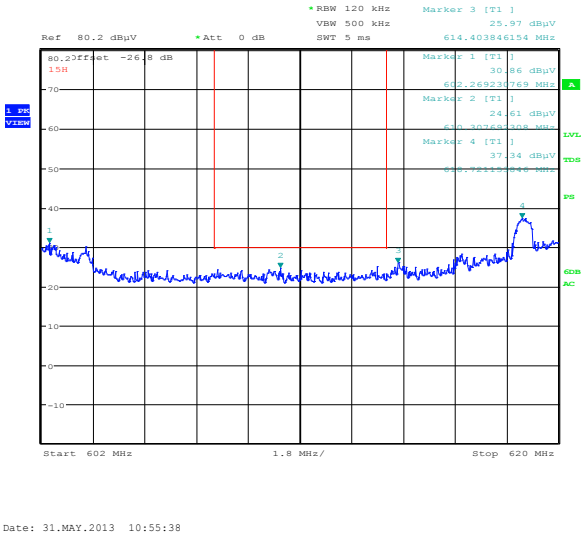


Figure 8.6-5: *Radiated spurious emissions within 602–620 MHz for high channel, sector antenna*

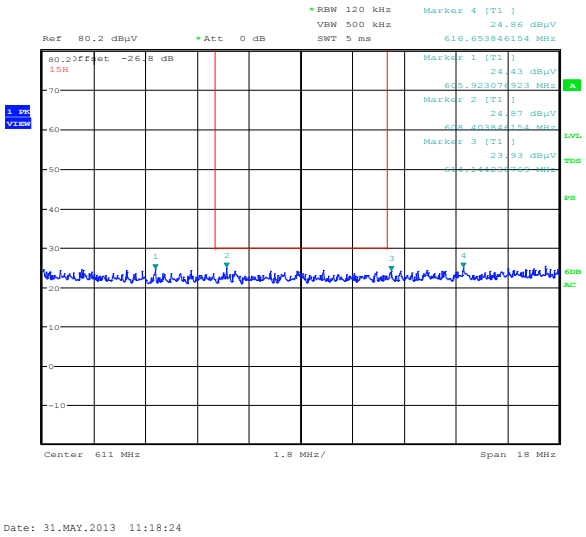


Figure 8.6-6: *Radiated spurious emissions within 602–620 MHz for low channel, omnidirectional antenna*

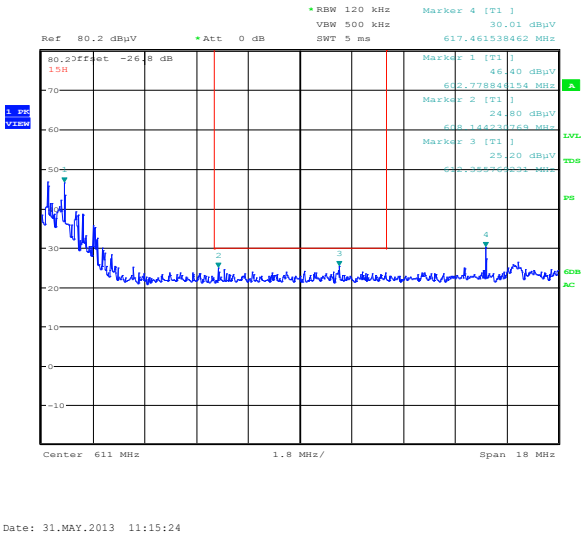


Figure 8.6-7: *Radiated spurious emissions within 602–620 MHz for channel 35, omnidirectional antenna*

8.6.4 Test data, continued

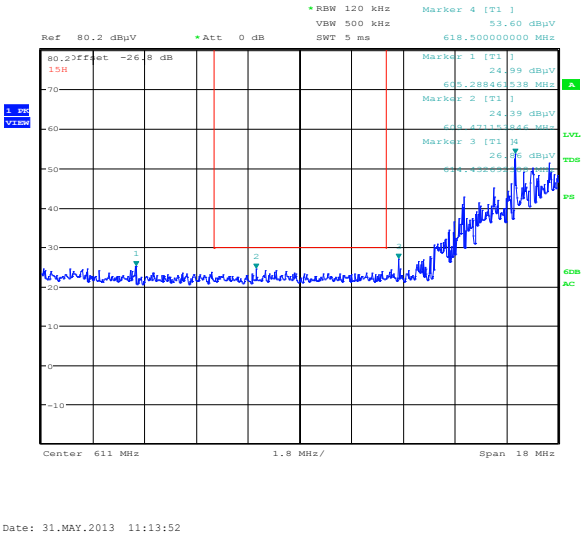


Figure 8.6-8: *Radiated spurious emissions within 602–620 MHz for channel 39, omnidirectional antenna*

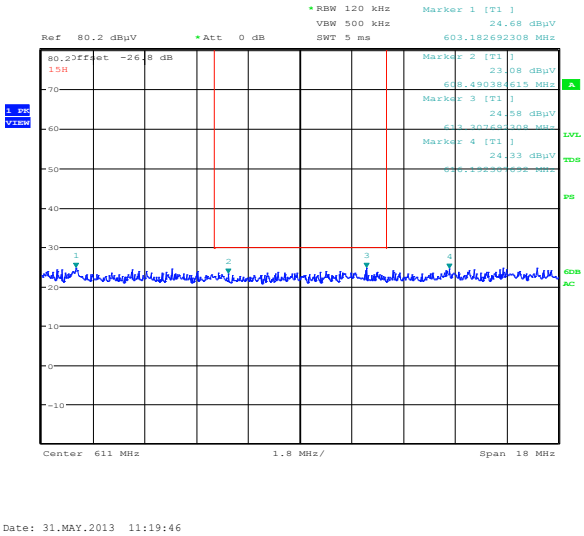
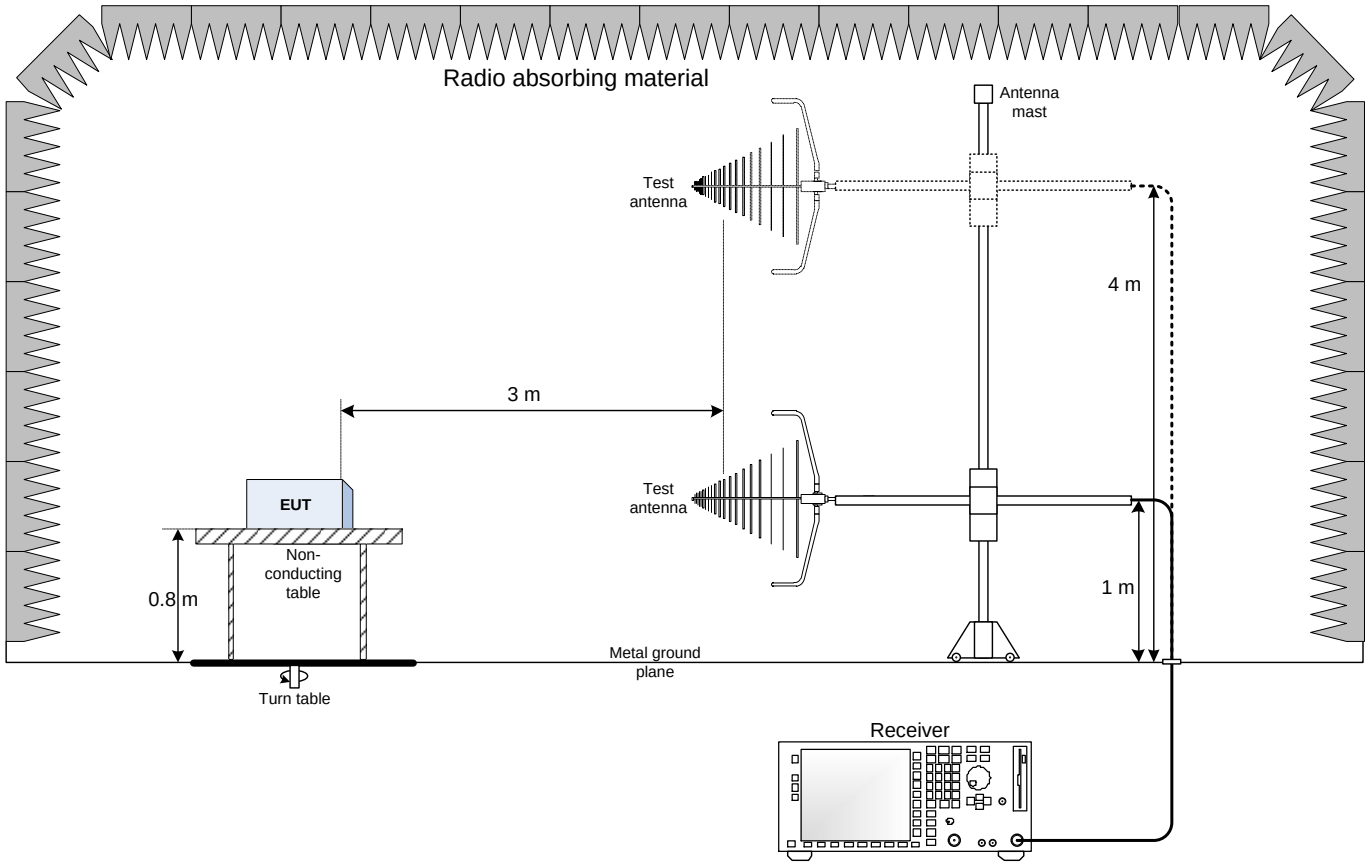


Figure 8.6-9: *Radiated spurious emissions within 602–620 MHz for high channel, omnidirectional antenna*

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up



9.2 Conducted emissions set-up